



Dart Aerospace Ltd.
1270 Aberdeen St
Hawkesbury, ON
K6A 1K7
Canada

Tel (613) 632-5200
Fax 613 632-5246

D350-748-243TRN
Job Sheet 181740



Part No: D350-748-243TRN

Job Qty: 1 ea

Part Name: Crosstube Installation, High Aft



Part Weight: 0 lbs

Status: Scheduled

Priority: Medium

Job Created: 8/7/18

Job Tracking No:

Due Date: 8/17/18

Created By: Marie Lajeunesse

Type: Stock

Description:

Note: DWG REV A IPP Rev:A New Issue LL 12.05.08

Ship Via:

Bill of Materials

Job Routing

Op No	Operation	Qty	Start Date	Due Date	Standard		Workcenter/Supplier		Sign-off
					Setup hrs	Run Hrs	Workcenter / Supplier	Lead Time	
90	Start up Operation	1 Ea		8/17/18	0.00	0.00	Start Up Crosstubes-1		MD
100	Mori Seiki	1 pcs		8/17/18	2.01	3.57	Mori Seiki TL-40		MD
110	QC	1 pcs		8/17/18	0.00	0.00	QC2-1		MD
120	Mori Seiki	1 pcs		8/17/18	0.00	3.57	Mori Seiki TL-40		MD
130	QC	1 pcs		8/17/18	0.00	0.00	QC2-1		MD
140	QC	1 pcs		8/17/18	0.00	0.00	QC8		MD
150	Crosstubes	1 pcs		8/17/18	0.00	0.81	Crosstubes-2		MD
190	Packaging	1 pcs		8/17/18	0.00	0.00	Packaging3-1		MD
200	QC21-SA	1 Ea		8/17/18	0.00	0.00	QC21		MD

Part Op 100 - 1-Cut tube on chop saw, leave extra mat'l for facing and install plugs 350-241 on both ends. 2-Face both sides of
Descriptions: tube. 3- Turn program 02000 section on both side as per folio FB468. 4- Turn program 03000 section on both side as per
folio FB468. 5- Blend transition lines only with belt sander 60 grit. Folio rev: A Dwg rev: A
120 - 1- Turn program 04000 section on both side as per folio FB468. 2- Turn program 05000 section on both side as per
folio FB468. 3- Blend transition lines only with belt sander 60 grit. 4-Scribe part # as per Dwg D350-748-243. Folio
rev: A Dwg rev: A
130 - PERFORME ULTRASONIC MEASUREMENT
150 - 1-Grind machining marks
190 - Identify and stock in kanban rack

Job BOM

Part / Item	Component Name	Quantity	Operation	Container
D6021-125	Crosstube Material - 17-4Ph SS	1 Ea (1 ea)	90-Start up Operation	

B151691

Job Allocations

Operation	Component Part	Required	Inventory	Allocated
90-Start up Operation	D6021-125	1	54	0

Part Specifications

Specifications could not be found.

DQA: _____ Date: _____

WORK ORDER NON-CONFORMANCE / UPDATE



QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐	AGAINST DEPARTMENT/PROCESS <table style="width: 100%; border: none;"> <tr> <td style="width: 15%;">Skid-tube ☐</td> <td style="width: 15%;">Cross tube ☐</td> <td style="width: 15%;">Water Jet ☐</td> <td style="width: 15%;">Engineering ☐</td> </tr> <tr> <td>Machining ☐</td> <td>Small Fab ☐</td> <td>Prod. Eng. Coord. ☐</td> <td>Quality ☐</td> </tr> <tr> <td>Thermoforming ☐</td> <td>Finishing ☐</td> <td>Rec/Store/Packaging ☐</td> <td>Other ☐</td> </tr> <tr> <td>Large Fab ☐</td> <td>Composite ☐</td> <td>Supplier ☐</td> <td></td> </tr> </table>				Skid-tube ☐	Cross tube ☐	Water Jet ☐	Engineering ☐	Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐	Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐	Large Fab ☐	Composite ☐	Supplier ☐	
Skid-tube ☐	Cross tube ☐	Water Jet ☐	Engineering ☐																		
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Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐																		
Large Fab ☐	Composite ☐	Supplier ☐																			
Date : _____	Step #: _____	QTY Effective : _____		MRB (QSI042) Approval																	
Description Work Order Deviation		Disposition																			
DART AEROSPACE 1270 Aberdeen Street Newbury, ON K6A 1K7 CANADA TEL.: 1 813 632-5200 Email: sales@dartaero.com www.dartaerospace.com		DART AEROSPACE Container No: S104157 Part: D350-748-243TRN Job No: 181740 Serial No/Batch: S104157 Revision: A Inspector: Exp Date: Instructions:		Completed By																	
				Lead hand / Supervisor Approval Verification																	
				QC / QA Coordinator Approval																	
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> ULT CATEGORY ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set ☐ Mislabeled ☐ Fit/Function ☐ Misaligned/off center ☐ Positioned Wrong ☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Drawing ☐ Finish ☐ Misread ☐ Turning Sequence </td> <td colspan="2" style="width: 50%;"></td> </tr> </table>						ULT CATEGORY ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set ☐ Mislabeled ☐ Fit/Function ☐ Misaligned/off center ☐ Positioned Wrong ☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Drawing ☐ Finish ☐ Misread ☐ Turning Sequence															
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① 181740
~~181677~~

DART AEROSPACE LTD	Work Order:
Description: Crosstube Assembly (AS350/355 High Aft SS)	Part Number: D350-748-243
Inspection Dwg: D350-748-243 Rev: A	Page 1 of 2

FIRST ARTICLE INSPECTION CHECKLIST

	Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.240	+/-0.005	2.2425	✓		CNC-04 ↓	
	2.180	+0.005/-0.000	2.184	✓			
	2.180	+0.005/-0.000	2.183	✓			
	2.208	+0.005/-0.000	2.212	✓			
	2.234	+0.005/-0.000	2.238	✓			
	2.253	+0.005/-0.000	2.257	✓			
	2.272	+0.005/-0.000	2.277	✓			
	2.299	+0.005/-0.000	2.304	✓			
	0.063	+/-0.010	.063	✓		RG	
	5.25	+/-0.060	5.255	✓		CNC-08	
	R0.063	+/-0.010	.063	✓		RG	
	R0.50	+/-0.030	.500	✓		RG	
SIDE B	2.240	+/-0.005	2.243	✓		CNC-04 ↓	
	2.180	+0.005/-0.000	2.185	✓			
	2.180	+0.005/-0.000	2.185	✓			
	2.208	+0.005/-0.000	2.213	✓			
	2.234	+0.005/-0.000	2.239	✓			
	2.253	+0.005/-0.000	2.258	✓			
	2.272	+0.005/-0.000	2.275	✓			
	2.299	+0.005/-0.000	2.303	✓			
	0.063	+/-0.010	.063	✓		RG	
	5.25	+/-0.060	5.258	✓		CNC-08	
	R0.063	+/-0.010	.063	✓		RG	
	R0.50	+/-0.030	.500	✓		RG	
	124.70	+/-0.060	124.70	✓		tape	

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

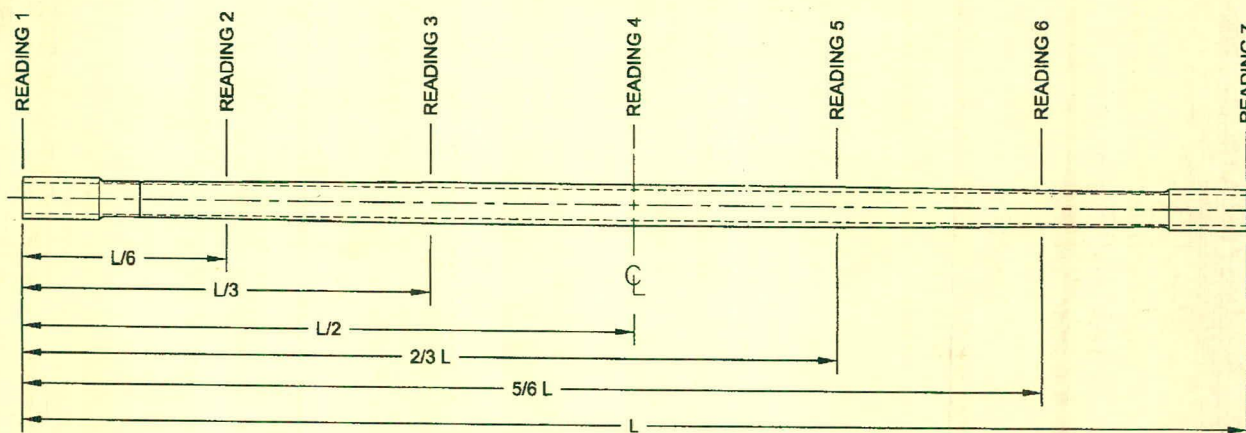
Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐					
Date :		Step #:		QTY Effective :			MRB (QS1042) Approval		
Description Work Order Deviation				Disposition				Completed By	
								Lead hand / Supervisor Approval Verification	
								QC / QA Coordinator Approval	
Root Cause		FAULT CATEGORY							
Environment ☐	No Re-verification ☐	Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐				
Design ☐	Operator ☐	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐				
Doc/Data ☐	Offset/Setup ☐	Centre Not Concentric ☐	BOM/Route ☐	Grain ☐	Over/Under tolerance ☐				
Equip/Tooling ☐	Supplier ☐	Cracks ☐	Broken/Damage/Defect ☐	Weld ☐	Part Incorrect ☐				
Handling/Pre ☐	Training ☐	Crimp/Kink/Ripple/Wave ☐	Inspection Incomplete/Unqualified ☐	Wrong Stock Pulled ☐	Part Lost/Missing ☐				
Material ☐	Use for Testing ☐	Cuffs ☐	Contamination ☐	Out of Sequence ☐	Part Moved ☐				
Internal Transport ☐	Poor Information ☐	Crushing ☐	Countersink ☐	Off-set ☐	Drawing ☐				
Tribal Knowledge ☐	Rushing ☐	Heat Treat ☐	Cut Too Short ☐	Mislabeled ☐	Finish ☐				
LOA ☐	Product Improvement ☐	Wave/Twist in Tube ☐	Instructions Incomplete/Unclear ☐	Fit/Function ☐	Misread ☐				
Substation ☐	Process Improvement ☐	Marks/Chatter ☐	Drill Holes ☐	Misaligned/off center ☐	Turning Sequence ☐				
Past Expiry Date ☐	Manufacturing Process ☐								
Misidentified ☐	Past Due ☐	OTHER : _____							

① 181740

DART AEROSPACE LTD		Work Order: 181740
Description: Crosstube Assembly (AS350/355 High Aft SS)		Part Number: D350-748-243
Inspection Dwg: D350-748-243 Rev: A		Page 2 of 2

WALL THICKNESS MEASUREMENT



Location	WALL THICKNESS MEASUREMENT (IN)				Deviation Δw (max-min)	TOLERANCE
	w1	w2	w3	w4		
READING 1 L= 0"	.141	.138	.135	.137	.006	0.030"
READING 2 L= 20.78	.129	.135	.136	.130	.007	
READING 3 L= 41.57	.163	.173	.169	.160	.013	
READING 4 L= 62.35	.164	.170	.172	.166	.008	
READING 5 L= 83.13	.165	.166	.166	.165	.001	
READING 6 L= 103.92	.129	.132	.125	.130	.007	
READING 7 L= 124.70	.135	.137	.137	.135	.002	

Calibration Result

Actual Block Thickness: 100-400

Sitiescan 250 Measured Thickness: 100-400

Measured by: MD	Audited by:	Preliminary Approval:	
Date: 2018-08-22	Date:	Date:	

Rev	Date	Change	Revised By	Approved
A	15.09.09	New Issue (P/O D350-748-203)	KJ	

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐					
Date :		Step #:		QTY Effective :			MRB (QS1042) Approval		
Description Work Order Deviation				Disposition				Completed By	
								Lead hand / Supervisor Approval Verification	
Root Cause Environment ☐ Design ☐ Doc/Data ☐ Equip/Tooling ☐ Handling/Pre ☐ Material ☐ Internal Transport ☐ Tribal Knowledge ☐ LOA ☐ Substation ☐ Past Expiry Date ☐ Misidentified ☐ No Re-verification ☐ Operator ☐ Offset/Setup ☐ Supplier ☐ Training ☐ Use for Testing ☐ Poor Information ☐ Rushing ☐ Product Improvement ☐ Process Improvement ☐ Manufacturing Process ☐ Past Due ☐		FAULT CATEGORY Pressure/Forced ☐ Bending ☐ Centre Not Concentric ☐ Cracks ☐ Crimp/Kink/Ripple/Wave ☐ Cuffs ☐ Crushing ☐ Heat Treat ☐ Wave/Twist in Tube ☐ Marks/Chatter ☐ Temperature/Cure ☐ Set-up ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Inspection Incomplete/Unqualified ☐ Contamination ☐ Countersink ☐ Cut Too Short ☐ Instructions Incomplete/Unclear ☐ Drill Holes ☐		Power Loss/Surge ☐ Folio/Program ☐ Grain ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set ☐ Mislabelled ☐ Fit/Function ☐ Misaligned/off center ☐ Positioned Wrong ☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Drawing ☐ Finish ☐ Misread ☐ Turning Sequence ☐					
OTHER : _____									

Item	Qty -243	Part Number	Description
1	X	D350-748-243	CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)
2	1	D6021-125	CROSSTUBE
3	2	D3502-1	SUPPORT
4	2	D5123-7	CLAMP CUSHION
5	1	AETC-1032	INSERT
6	2	MS21920-20 OR MS21920-21/-22	CLAMP (PER DART SPEC. M-MS21920-20/-21/-22)
7	1	NAS1149C0363R	WASHER (OR AN960C10)
8	1	NAS1635-3-8	SCREW (OR MS51958-63)
9	A/R	PROSEAL 890 B-2	SEALANT, AMS-S-8802 CLASS B-2

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6021-125
FINISHED LENGTH AFTER TURNING = 124.70±0.06 (AFTER BENDING/TRIMMING = 122.70 REF)
- 2) FINISH: PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCE: PER DART QSI 018 UNLESS OTHERWISE NOTED.
WALL THICKNESS ECCENTRICITY PER DART QSI 038 7.2
MIN. ALLOWABLE WALL IS -0.020 FROM NOMINAL
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART PART NUMBER "D350-748-243" AND BATCH NUMBER ON INSIDE OF CUFF
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 29.85 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.290 HOLE.
- 9) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.

TURNING

- 10) BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.

BENDING

- 11) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES PER SIDE. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D. ON TOP HALF OF BEND, AND 8% ON BOTTOM HALF OF BEND.
- 12) MAX AMPLITUDE OF RIPPLING ALONG BENT PORTION OF THE TUBE IS 0.030 (ZN A1-3)
- 13) MAX TWIST: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.38 (ZN C1-3).

ASSEMBLY

- 14) TO INSTALL D3502-1 SUPPORT: ABRABE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.02" TO 0.05" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- 15) TORQUE CLAMPS 60 TO 80 IN.-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER

181740 NO. ~~1816~~ MJS
18-08-03

DEO ATTACHED

RELEASED

2015 MAR 18

RELEASED

2015 MAR 18

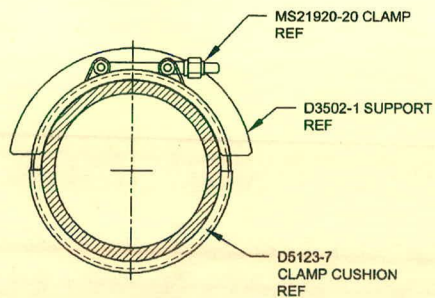
UNDER REVIEW

15/4/15 CK
LRF 15/5/1 9/16/25

A	NEW ISSUE	CP	15.01.21
REV.	DESCRIPTION	BY	DATE
DESIGN	q		
DRAWN	q		
CHECKED	A.P.		
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	15.01.21		

DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWING NO. D350-748-243	REV. A SHEET 1 OF 4
TITLE CROSSTUBE (AS 350/355 HI AFT)	SCALE NTS
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**D350-748-243
ASSEMBLY DETAIL**



SECTION A-A D4-2
SCALE 6X

INSTALL THIS SIDE ONLY, AFTER FINISH:
AETC-1032 INSERT
NAS1149C0363R WASHER
NAS1635-3-8 SCREW

14 15
D3502-1 SUPPORT
MS21920-20 CLAMP (OR -21/-22)
D5123-7 RUBBER CUSHION
2 PL

D350-748-243
BENT TUBE

DEO ATTACHED

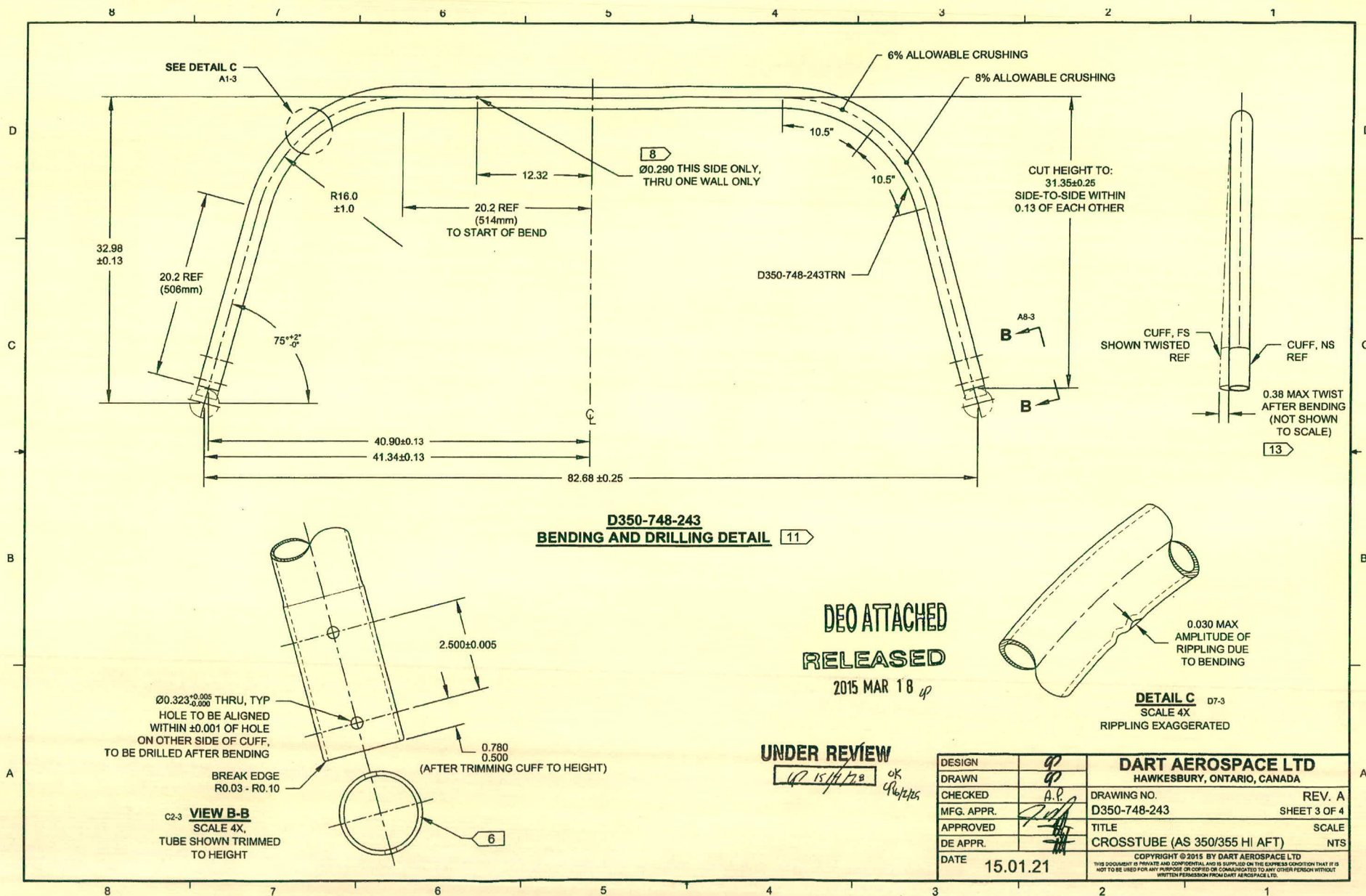
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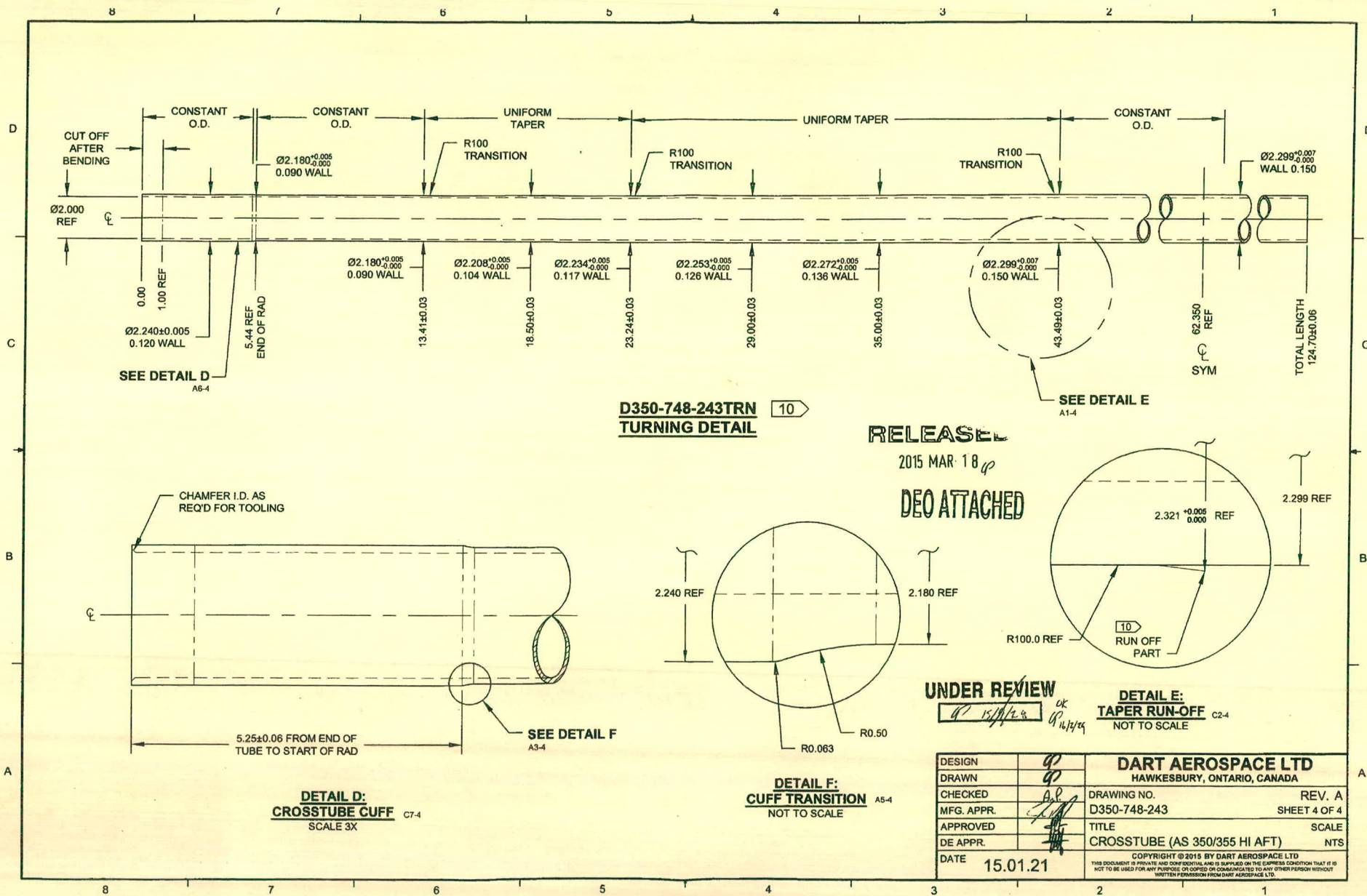
2015 MAR 18

UNDER REVIEW

15/12/22 6K 9/16/29

DESIGN	40	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWN	40		
CHECKED	A.P.	DRAWING NO.	REV. A
MFG. APPR.	2/11/22	D350-748-243	SHEET 2 OF 4
APPROVED	2/11/22	TITLE	SCALE
DE APPR.	2/11/22	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	15.01.21	COPYRIGHT © 2015 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	





DRAWING NO. D350-748-243	TITLE CROSSTUBE	REV. A	DART AEROSPACE LTD ENGINEERING ORDER		D.E.O. NO. D350-748-243-A-1	SHEET NO. SHEET 1 OF 1	SCALE NTS
DRAWN <i>q</i>	CHECKED <i>ASS</i>	MFG. APPR. <i>[Signature]</i>	APPROVED <i>[Signature]</i>		DE APPR. <i>[Signature]</i>		
DATE 15.11.18	DATE 15.11.18	DATE 14.02.19	DATE FEB 19 2016		DATE 2016.02.19		

AMEND NOTE 2 (SHEET 1) AS FOLLOWS:

- 2) FINISH: PREPARE SURFACE PER DART QSI 005 4.1.4
 PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
 PAINT OUTSIDE PER DART QSI 005 4.2
 OR
 POWDER COAT WHITE (4.3.5.2) PER DART QSI 005 4.3

RELEASED
 2016-02-26
EN 16-534 *[Signature]*

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